

# **BROADCAST RECEIVER PROVIDED WITH RECEPTION CHANNEL NUMBER DISPLAY FUNCTION**

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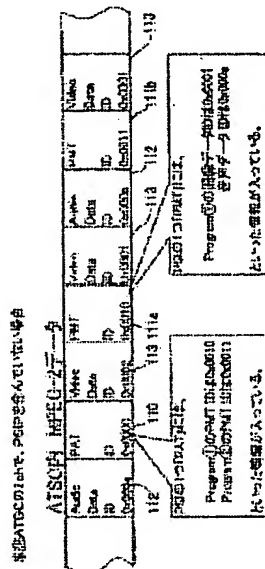
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## **Abstract of JP 2002344838 (A)**

**PROBLEM TO BE SOLVED:** To assign a virtual channel number to a user for convenience and to display it in OSD even if a PSIP is obtained in a broadcast receiver provided with a reception channel number display function. **SOLUTION:** A physical channel number is assigned to a virtual main channel number for convenience. Assignment is performed to a virtual sub-channel number for convenience in response to the order of ID numbers of PMT 111a which is obtained by analyzing PAT 110 contained in M PEG-2 data. The virtual channel numbers are displayed in OSD in a form which is different from that of the virtual channel number obtained by analyzing PSIP.



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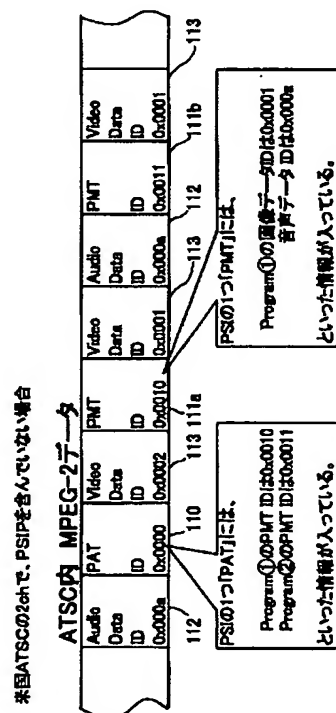
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(54) 【発明の名称】 受信チャンネル番号表示機能を有する放送受信装置

## (57) 【要約】

【課題】 受信チャンネル番号表示機能を有する放送受信装置において、P S I Pを取得できなかったときであっても、ユーザにとって便宜上の仮想チャンネル番号を割り当ててO S D表示する。

【解決手段】 便宜上の仮想メインチャンネル番号には、物理チャンネル番号を割り当てる。便宜上の仮想サブチャンネル番号は、MPEG-2データに含まれるP A T 110を解析して取得したPMT 111aのID番号の順番に従って割り当てる。これらの便宜上の仮想チャンネル番号をP S I Pを解析した取得した仮想チャンネル番号とは異なる形態でO S D表示する。



## 【特許請求の範囲】

【請求項 1】 装置本体にチャンネル変更指令を入力するための入力手段と、放送局から A T S C (Advanced Television Systems Committee) の規格に準拠させて M P E G (Moving Picture Experts Group) -2 の情報パケットに P S I P (Program and System Information Protocol) の情報パケットを付加した上で発信されるデジタル／アナログ放送信号を受信する受信手段と、前記受信手段により受信したデジタル放送信号から映像信号、音声信号及び制御信号を抽出する信号抽出手段と、前記信号抽出手段によって抽出された映像信号又はアナログ放送信号に含まれる映像信号を復号して、その復号信号を本装置に接続された映像を表示する表示手段に出力するデジタル／アナログ復号手段と、前記信号抽出手段によって抽出された制御信号を記憶する記憶手段と、前記表示手段に所定のオンスクリーンディスプレイ（以下、O S D と記す）表示をさせる O S D 出力手段と、上記装置の各手段を制御する制御手段とを備え、受信チャンネル番号を前記表示手段より O S D 表示する受信チャンネル番号表示機能を有する放送受信装置において、同一又は同一系統の放送局からデジタル放送信号とアナログ放送信号とが互いに異なる物理チャンネルにより発信され、デジタル放送信号は、前記物理チャンネルごとに発信され、1つの物理チャンネルにつき1又は複数のコンテンツを発信するためのサブチャンネルを含み、かつ、このサブチャンネルに前記アナログ放送の物理チャンネル番号と同一の番号及びサブチャンネル番号からなる仮想チャンネル番号が付与されており、前記制御手段は、前記信号抽出手段が抽出した制御信号の中から前記 P S I P の情報パケットを取得し、それを解析して得られた V C T (Virtual Channel Table) を参照することにより、受信する仮想チャンネル番号を特定し、この仮想チャンネル番号の O S D 表示を行い、前記制御信号の中から P S I P を取得できなかったときは前記 M P E G -2 の情報パケットを取得し、その中に含まれる P A T (Program Association Table) 及び P M T (Program Map Table) を解析して検出した各サブチャンネルの順番に従って各サブチャンネルに便宜上の仮想サブチャンネル番号を割り当て、前記物理チャンネル番号と、前記便宜上の仮想サブチャンネル番号とからなるチャンネル番号を便宜上の仮想チャンネル番号として、前記 V C T を解析することにより特定した仮想チャンネル番号とは異なる形態の O S D 表示を行うことを特徴とする受信チャンネル番号表示機能を有する放送受信装置。

【請求項 2】 装置本体にチャンネル変更指令を入力するための入力手段と、放送局から A T S C (Advanced Television Systems Committee) の規格に準拠させて M P E G (Moving Picture Experts Group) -2 の情報パケ

ットに P S I P (Program and System Information Protocol) の情報パケットを付加した上で発信されるデジタル放送信号を受信する受信手段と、前記受信手段により受信したデジタル放送信号から映像信号、音声信号及び制御信号を抽出する信号抽出手段と、前記信号抽出手段によって抽出された映像信号又はアナログ放送信号に含まれる映像信号を復号して、その復号信号を本装置に接続された映像を表示する表示手段に出力するデジタル復号手段と、前記信号抽出手段によって抽出された制御信号を記憶する記憶手段と、前記表示手段に所定のオンスクリーンディスプレイ（以下、O S D と記す）表示をさせる O S D 出力手段と、上記装置の各手段を制御する制御手段とを備え、受信チャンネル番号を前記表示手段より O S D 表示する受信チャンネル番号表示機能を有する放送受信装置において、同一又は同一系統の放送局からデジタル放送信号とアナログ放送信号とが互いに異なる物理チャンネルにより発信され、デジタル放送信号は、前記物理チャンネルごとに発信され、1つの物理チャンネルにつき1又は複数のコンテンツを発信するためのサブチャンネルを含み、かつ、このサブチャンネルに前記アナログ放送の物理チャンネル番号と同一の番号とサブチャンネル番号とからなる仮想チャンネル番号が付与されており、前記制御手段は、前記制御信号の中から前記 M P E G -2 の情報パケットを取得し、その中に含まれる P S I (Program Specific Information) を解析して検出した各サブチャンネルの順番に従って各サブチャンネルに便宜上の仮想サブチャンネル番号を割り当て、前記物理チャンネル番号と、前記便宜上の仮想サブチャンネル番号とからなるチャンネル番号を便宜上の仮想チャンネル番号として、O S D 表示を行うことを特徴とする受信チャンネル番号表示機能を有する放送受信装置。

【請求項 3】 前記制御手段は、前記信号抽出手段が抽出した制御信号に含まれる P S I P (Program and System Information Protocol) を取得したときは、該 P S I P を解析して得られた V C T (Virtual Channel Table) を参照することにより、受信する仮想チャンネル番号を特定し、該仮想チャンネル番号を O S D 表示することを特徴とする請求項 2 に記載の受信チャンネル番号表示機能を有する放送受信装置。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】 本発明は、放送受信装置に係り、特に受信する仮想チャンネル番号を表示手段に O S D 表示させる受信チャンネル番号表示機能を有するデジタル放送受信装置に関するものである。

## 【0002】

【従来の技術】 従来より、ケーブルデジタル放送等において、M P E G -2 規格で圧縮・符号化した映像及び音声信号を C A T V 伝送路を介して発信する際に用いられる

変調器として64QAM変調器が知られている(例えば、特開2000-197020号公報参照)。これは、ユーザ(受信者)側の放送受信装置にチャンネル番号を表示させて、放送受信中に障害が発生したときに、上記表示させたチャンネル番号からいずれの64QAM変調器で障害が発生したかを特定可能とするものである。この変調器は、放送局側が放送信号の発信の際に使用される。また、視聴可能なチャンネルのみを表示画面に出力して、ユーザのチャンネル選択操作を容易にしたデジタル放送受信装置が知られている(例えば、特開平10-200868号公報参照)。

【0003】ところで、北米においては、近年、放送局からATSC(Advanced Television Systems Committee)に準拠するデジタル放送が配信されている。このデジタル放送を受信して、既存のNTSC(National Television Systems Committee)のアナログ放送対応のテレビジョン受像機が受像可能な信号に変換するための放送受信装置(セットトップボックス:以下STBと記す)が普及しつつある。このSTBに特開平10-200868号公報に開示された機能を持たせることは可能である。

【0004】ATSCのデジタル放送では、アナログ放送信号とは異なる物理チャンネルによりデジタル放送信号が発信されている。1つの物理チャンネルは、1又は複数のコンテンツを発信するためのサブチャンネルを含み、このサブチャンネルには、同一又は同一系統の放送局から発信されるアナログ放送の物理チャンネル番号と同一の番号(メインチャンネル番号)及びサブチャンネル番号からなる仮想チャンネル番号が付与されている。従って、仮想チャンネルは、メインチャンネルとサブチャンネルとにより階層的に構成されている。

【0005】デジタル放送の放送信号は、映像信号、音声信号及び制御信号からなり、ATSCのデジタル放送では、上記制御信号に仮想チャンネル番号や放送局名に関する情報を含んだPSIP(Program and System Information Protocol)を添付して発信されるように義務付けられている。STBの制御部は、このPSIPを取得・解析して得られたVCT(Virtual Channel Table)を参照することにより、受信する仮想チャンネル番号を特定できる。デジタル放送では、既に述べたように、各チャンネルはメインチャンネル番号とサブチャンネル番号とにより階層的に構成されており、その構成は複雑であるため、ユーザは自らが選択したチャンネルの構成を理解できない場合がある。そこで、STBは、上記特定した仮想チャンネル番号を表示装置にOSD表示して、ユーザの使い勝手の向上を図っている。

【0006】

【発明が解決しようとする課題】しかしながら、放送局によっては、PSIPを制御信号として添付せずにデジタル放送信号を発信している局も存在し、このような放

送局のチャンネルを受信した場合は、PSIPを取得することができない。また、放送局がPSIPを添付して放送信号を発信していても、例えばPSIPの信号に不正なPSIPデータが付加された等の何らかの事情により、PSIPの取得に失敗する場合もある。このようにPSIPを取得できない場合は、映像信号を取得し受像することは可能であっても、その仮想チャンネル番号は不明であるためそのOSD表示を行うことができず、ユーザの使い勝手が良くない。

【0007】本発明は、上述した問題点を解決するためになされたものであり、デジタル放送受信装置において、放送信号に含まれるPSIPを取得できなかった場合においても、ユーザにとって便宜上のチャンネル番号を表示することにより、チャンネル変更を容易なものとして使い勝手の向上を図った受信チャンネル番号の表示機能を有する放送受信装置を提供することを目的とする。

【0008】

【課題を解決するための手段】上記目的を達成するために請求項1の発明は、装置本体にチャンネル変更指令を入力するための入力手段と、放送局からATSC(Advanced Television Systems Committee)の規格に準拠させてMPEG(Moving Picture Experts Group)-2の情報パケットにPSIP(Program and System Information Protocol)の情報パケットを付加した上で発信されるデジタル/アナログ放送信号を受信する受信手段と、受信手段により受信したデジタル放送信号から映像信号、音声信号及び制御信号を抽出する信号抽出手段と、信号抽出手段によって抽出された映像信号又はアナログ放送信号に含まれる映像信号を復号して、その復号信号を本装置に接続された映像を表示する表示手段に出力するデジタル/アナログ復号手段と、信号抽出手段によって抽出された制御信号を記憶する記憶手段と、表示手段に所定のオンスクリーンディスプレイ(以下、OSDと記す)表示をさせるOSD出力手段と、上記装置の各手段を制御する制御手段とを備え、受信チャンネル番号を表示手段よりOSD表示する受信チャンネル番号表示機能を有する放送受信装置において、同一又は同一系統の放送局からデジタル放送信号とアナログ放送信号とが互いに異なる物理チャンネルにより発信され、デジタル放送信号は、物理チャンネルごとに発信され、1つの物理チャンネルにつき1又は複数のコンテンツを発信するためのサブチャンネルを含み、かつ、このサブチャンネルにアナログ放送の物理チャンネル番号と同一の番号及びサブチャンネル番号からなる仮想チャンネル番号が付与されており、制御手段は、信号抽出手段が抽出した制御信号の中からPSIPの情報パケットを取得し、それを解析して得られたVCT(Virtual Channel Table)を参照することにより、受信する仮想チャンネル番号を特定し、この仮想チャンネル番号のOSD表示を行い、制

御信号の中からP S I Pを取得できなかったときはM P E G-2の情報パケットを取得し、その中に含まれるP A T (Program Association Table) 及びP M T (Program Map Table) を解析して検出した各サブチャンネルの順番に従って各サブチャンネルに便宜上の仮想サブチャンネル番号を割り当て、物理チャンネル番号と、便宜上の仮想サブチャンネル番号とからなるチャンネル番号を便宜上の仮想チャンネル番号として、V C Tを解析することにより特定した仮想チャンネル番号とは相異なる形態のO S D表示を行うものである。

【0009】この構成においては、デジタル放送信号は、映像信号、音声信号及び制御信号を含み、M P E G-2規格により動画圧縮されパケット化されたデータ(M P E G-2データ)で放送局から発信される。制御信号には、A T S C放送を受信するための仮想チャンネルに関する情報を有するP S I Pの情報パケットが付加される。M P E G-2の情報パケットには、番組の構成に関する情報を有するP S I (Program Specific Information) 等が含まれる。A T S Cでは、P S I Pをデジタル放送信号に添付して発信するように義務付けられているが、放送局によっては必ずしもこれが添付された状態で発信されるとは限られない。一方、P S Iは、映像信号及び音声信号を抽出するために必要な情報であるので、M P E G-2内の情報パケットとして必ず添付された状態で発信される。制御手段は、放送信号に含まれるP S I Pを取得したときは、それを解析して得られたV C Tを参照することにより、受信する仮想チャンネル番号を特定し、その仮想チャンネル番号をO S D表示する。放送信号にP S I Pが含まれていないとき等、何らかの事情によりP S I Pを取得できないときは、M P E G-2データに含まれるP S Iを解析してサブチャンネルの構成情報を取得し、便宜上のサブチャンネル番号を割り当てる。本構成では、P S Iの1つであるP A T及びP M Tを解析して、各サブチャンネルに便宜上の仮想サブチャンネル番号を割り当てる。さらに、物理チャンネル番号と、この便宜上の仮想サブチャンネル番号とによってO S D表示のための便宜上の仮想チャンネル番号を付与する。このM P E G-2データに含まれるP S Iを解析して得られた便宜上の仮想サブチャンネル番号は、P M Tのプログラムの順番に従って割り当てたものであり、放送局が任意に設定することができる本来のサブチャンネル番号とは必ずしも一致するものではない。そこで、ユーザが、M P E G-2データを解析して得られた便宜上の仮想チャンネル番号と、P S I Pを解析して得られた本来の仮想チャンネル番号とを区別できるように、それぞれを異なる形態で区別してO S D表示させる。このO S D表示の区別はユーザの要望により無効にしてもよい。この場合、便宜上の仮想チャンネル番号は、通常の仮想チャンネル番号と同様のO S D表示として出力される。

【0010】また、請求項2の発明は、装置本体にチャ

ンネル変更指令を入力するための入力手段と、放送局からA T S C (Advanced Television Systems Committee) の規格に準拠させてM P E G (Moving Picture Experts Group) -2の情報パケットにP S I P (Program and System Information Protocol) の情報パケットを付加した上で発信されるデジタル放送信号を受信する受信手段と、受信手段により受信したデジタル放送信号から映像信号、音声信号及び制御信号を抽出する信号抽出手段と、信号抽出手段によって抽出された映像信号又はアナログ放送信号に含まれる映像信号を復号して、その復号信号を本装置に接続された映像を表示する表示手段に出力するデジタル復号手段と、信号抽出手段によって抽出された制御信号を記憶する記憶手段と、表示手段に所定のオンスクリーンディスプレイ(以下、O S Dと記す)表示をさせるO S D出力手段と、上記装置の各手段を制御する制御手段とを備え、受信チャンネル番号を表示手段よりO S D表示する受信チャンネル番号表示機能を有する放送受信装置において、同一又は同一系統の放送局からデジタル放送信号とアナログ放送信号とが互いに異なる物理チャンネルにより発信され、デジタル放送信号は、物理チャンネルごとに発信され、1つの物理チャンネルにつき1又は複数のコンテンツを発信するためのサブチャンネルを含み、かつ、このサブチャンネルにアナログ放送の物理チャンネル番号と同一の番号とサブチャンネル番号とからなる仮想チャンネル番号が付与されており、制御手段は、制御信号の中からM P E G-2の情報パケットを取得し、その中に含まれるP S I (Program Specific Information) を解析して検出した各サブチャンネルの順番に従って各サブチャンネルに便宜上の仮想サブチャンネル番号を割り当て、物理チャンネル番号と、便宜上の仮想サブチャンネル番号とからなるチャンネル番号を便宜上の仮想チャンネル番号として、O S D表示を行うものである。

【0011】この構成においては、請求項1と同様に、放送信号はM P E G-2規格により動画圧縮されパケット化されたM P E G-2データで放送局から発信される。制御信号として仮想チャンネルに関する情報を有するP S I Pの情報パケットが付加される。M P E G-2データには、番組の構成に関する情報を有するP S I等を含んでいる。制御手段は、M P E G-2データに含まれるP S Iを解析して便宜上のサブチャンネル番号を割り当てる。すなわち、P S Iを解析して検出した各サブチャンネルの順番に従って便宜上の仮想サブチャンネル番号として割り当てる。さらに、物理チャンネル番号と、この便宜上の仮想サブチャンネル番号とによってO S D表示のための便宜上の仮想チャンネル番号を付与し、これをO S D表示する。

【0012】また、請求項3の発明は、請求項2に記載の受信チャンネル番号表示機能を有する放送受信装置において、制御手段は、信号抽出手段が抽出した制御信号

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に含まれるP S I P (Program and System Information Protocol) を取得したときは、該P S I Pを解析して得られたV C T (Virtual Channel Table) を参照することにより、受信する仮想チャンネル番号を特定し、該仮想チャンネル番号をO S D表示するものである。この構成においては、P S I Pを取得したときは、このP S I Pを解析することにより、放送局が任意に設定した仮想チャンネル番号を取得して、これをO S D表示する。

#### 【0013】

【発明の実施の形態】以下、本発明を具体化した一実施形態に係るデジタル放送受信装置（セットトップボックス：以下S T Bと記す）について図面を参照して説明する。図1はS T Bのブロック構成を示す。S T B 1は、本体ボタン又はリモコン等の入力装置1 1（入力手段）を用いたユーザからのチャンネル変更等の操作入力に応じて、テレビジョン放送局から発信されA T S Cに準拠する符号化されたデジタル放送信号をアンテナ1 0により受信し、N T S Cに準拠した映像信号に変換して表示装置1 2（表示手段）に表示させる装置である。チャンネル変更の操作としては、例えば、入力装置に備えられている“テンキー（数字キー）”で直接的にチャンネル番号を入力して変更する方法と、同入力装置1 1に備えられている“アップダウンキー（矢印キー）”を操作して上下に隣接するチャンネルに変更する方法が採られている。S T B 1は、ユーザが、後者の“アップダウンキー”を操作してチャンネルを変更したときにも、変更先の仮想チャンネル番号を即座に理解できるように、P S I Pを取得・解析することにより受信する仮想チャンネル番号を特定し、表示装置1 2にO S D表示させる機能を有している。なお、A T S Cでは、M P E G-2規格により動画圧縮されパケット化されたデジタル放送信号が発信されている。

【0014】S T B 1は、例えば、8 V S B (Vestigial Side Band) の変調方式により送信されるデジタル放送信号を受信するチューナ2（受信手段）と、チューナ2により受信したデジタル放送信号をトランスポートストリーム（Transport Stream：以下、T Sと記す）信号に変換するT S変換回路4と、T S変換回路4が変換したT S信号を解析して映像信号を復号し、表示装置1 2に映像を表示させるT S解析回路6と、デジタル放送の各メインチャンネルの発信周波数、放送言語等に関するチャンネル情報を記憶するメモリ7（記憶手段）と、所定の放送言語のデジタル音声信号を抽出し、スピーカ装置1 5に音声出力させる音声出力回路9と、受信装置各部を制御するC P Uからなる制御部8（制御手段）とを備えている。

【0015】チューナ2は、アンテナ1 0により受信されたデジタル放送信号の供給を受け、ユーザが入力装置1 1から制御部8に入力した指令に応じて選局動作を行ない、ユーザが入力したチャンネルに対応する周波数帯

域に存在する8 V S B変調のデジタル放送信号を受信する。T S変換回路4は、チューナ2が受信した8 V S B変調の放送信号をT S信号に変換する。

【0016】T S解析回路6は、T S変換回路4が変換したT S信号を解析し、必要に応じてO S D表示を付加した映像信号を表示装置1 2に出力する。図2は、T S解析回路6のブロック構成を示す。T S解析回路6は、トランスポートパーサ6 a（信号抽出手段）と、外部メモリインターフェース6 bと、ビデオデコーダ6 c（デジタル復号手段）と、ディスプレイコントローラ6 dと、O S D回路6 e（O S D出力手段）と、デジタルビデオエンコーダ6 fと、オーディオインターフェース6 gと、ホストプロセッサインターフェース6 hとP L L（Phase Locked Loop）回路6 iとを備えている。トランスポートパーサ6 aは、T S変換回路4から伝送されたT S信号を取得し、これを映像信号、音声信号及び制御信号に分解する。外部メモリインターフェース6 bは、ホストプロセッサインターフェース6 hを介して制御部8からの指令を受け、トランスポートパーサ6 a、ビデオデコーダ6 c及びディスプレイコントローラ6 dとメモリ7との接続を司る。例えば、トランスポートパーサ6 aによって分解された映像信号、音声信号及び制御信号は、それぞれ、外部メモリインターフェース6 bを介してメモリ7に格納される。

【0017】ビデオデコーダ6 cは、制御部8からの指令を受け、メモリ7に格納させた映像信号を読み出して復号する。ディスプレイコントローラ6 dは、制御部8からの指令を受け、ビデオデコーダ6 cが復号した映像信号をN T S Cのフォーマットに変換する。O S D回路6 eは、制御部8からの指令を受け、ビデオデコーダ6 cが変換したN T S Cの映像信号をデジタルビデオエンコーダ6 fに送出する他、必要に応じて映像信号にO S D表示を付加した信号をデジタルビデオエンコーダ6 fに送出する。このO S D回路6 eは、制御部8からの指令に応じて、1フレームの映像信号ごとにO S D表示を付加する演算処理を行い、所定の色によるO S D表示を表示装置1 2に表示させることができる。また、上記演算処理を行うためにO S D回路6 eには、メモリが内蔵されている。

【0018】デジタルビデオエンコーダ6 fは、制御部8からの指令を受け、O S D回路6 eから送出された映像信号をアナログ信号に変換して表示装置1 2に出力する。オーディオインターフェース6 gは、トランスポートパーサ6 aが分解した音声信号を音声出力回路9に送出する。また、ホストプロセッサインターフェース6 hは、制御部8からの指令をトランスポートパーサ6 aと、外部メモリインターフェース6 bと、ビデオデコーダ6 cと、ディスプレイコントローラ6 dと、O S D回路6 eと、デジタルビデオエンコーダ6 fに伝送する。また、P L L回路6 iは、入力されるクロック信号に基



づいて局部発振周波数を所定の周波数に一致させる。

【0019】メモリ7は、トランスポートパサ6aが分解したMPEG-2データを記憶する。このMPEG-2データについては、後程、図3を参照して詳述する。制御部8は、ユーザによる入力装置11を用いた入力操作を受けて、各部の制御をデータバス(Data-Bus)を通して行う。例えば、制御部8は、メモリ7に格納された制御信号に含まれるPSIPを読み出して解析し、それに含まれるステータス信号に基づいて受信するチャンネルの仮想チャンネル番号を取得し、この仮想チャンネル番号をOSD回路6e、デジタルビデオエンコーダ6fを介して表示装置12に出力させる。

【0020】音声出力回路9は、オーディオインターフェース6gから取得した音声信号をスピーカ装置15に対応する音声信号に変換し、この音声信号をスピーカ装置15に送出する。具体的には、制御部8から指示された放送言語に関する音声信号を抽出し、復号処理し、アナログ信号に変換している。入力装置11は、ユーザによるチャンネル変更等の操作指令を制御部8に対して入力するための装置である。この入力装置11の例としては、STB1の前面に設けた本体ボタンや、赤外線等を用いてSTB1の動作指令を行うリモコン等が挙げられる。表示装置12は、テレビジョン受像機の表示画面を用いてもよいし、また、CRTの他、LCD(Liquid Crystal Display)やPDP(Plasma Display Panel)等のフラットパネルディスプレイ装置であってもよい。その際、表示装置12が、デジタル信号の入力に対応していれば、デジタルビデオエンコーダ6fを介さずに、OSD回路6eから表示装置12の入力端子に直接に接続する構成であってもよい。スピーカ装置15は、音声出力回路9に接続され、音声出力回路9にて処理された音声信号に基づいて音声を出力する。

【0021】制御部8は、上述したように、PSIPを解析し、受信するチャンネルの仮想チャンネル番号を取得し、表示装置12にOSD表示させる。さらに、制御部8は、何らかの事情により、PSIPを取得できなかった場合は、放送信号に含まれるMPEG-2データを解析して、便宜上の仮想チャンネル番号を付与する。

【0022】図3は、TS信号としてメモリに記憶されている、MPEG-2データの一例を示している。MPEG-2データは、PSIと音声信号(音声データ)112及び映像信号(画像データ)113を有している。上記PSIは、MPEG-2データ内に必ず含まれるデータであり、仮想チャンネル番号や放送局名等は持たないが、番組データ構成情報としてのPAT 110及びPMT 111a, 111bを有している。PAT 110には、受信する物理チャンネル内で放送されている全てのサブチャンネルにそれぞれ対応するプログラム番号のPMT IDに関する情報が格納されている。例えば、サブチャンネルの1つであるプログラム①のPMT IDは0x0010であり、別の

サブチャンネルであるプログラム②のPMT IDは0x0011であるといった情報が格納されている。ここで、プログラム①のサブチャンネルを受信するときは、上記PAT 110の情報に従ってID番号が0x0010であるPMT 111aに格納されたデータを読み出す。PMT 111aには、プログラム①の画像データIDは0x0001であり、同音声データIDは0x000aであるといった情報が格納されている。このPMT 111aの情報に従って、ビデオデコーダ6cが画像データ113のうち0x0001のID番号が付与されたものを順次読出し、音声出力回路9が音声データ112のうち0x000aのID番号が付与されたものを順次読出し、プログラム①のサブチャンネルの映像信号及び音声信号をそれぞれデコードする。このように、PAT 110は、放送信号から映像信号及び音声信号を抽出するために、MPEG-2データ内に必ず含まれている。

【0023】制御部8は、MPEG-2データのPAT 110に格納されている情報を解析することにより、受信する物理チャンネル内で放送されている全てのサブチャンネルにそれぞれ対応するPMT IDを取得することができる。制御部8は、各サブチャンネルにそれぞれ対応するPMT IDの順番に従って便宜上の仮想サブチャンネル番号を割り当てる。なお、このようにして割り当てた便宜上のサブチャンネル番号は、PMT IDの順番に従う番号となるため、放送局が任意に設定した仮想サブチャンネル番号とは必ずしも一致するものではない。

【0024】図4は、上述のようにして、MPEG-2データを解析して物理チャンネル“2”について取得した便宜上の仮想チャンネル番号に関する情報を表示するチャンネルマップの一例を示している。ここで物理チャンネル“2”の仮想のメインチャンネル番号は、PSIPを取得できなかったため、便宜上の番号として物理チャンネルと同一の“2”を付与している。そして、仮想サブチャンネル番号には、上記のごとく割り当てた便宜上の仮想サブチャンネル番号である“1”、“2”を付与する。この便宜上の仮想サブチャンネル番号は、PAT 110のプログラム番号を割り当てているので、連続した番号で構成される。また、物理チャンネル“5”には、通常通り、PSIPを解析して取得した仮想のメインチャンネル番号“15”と仮想サブチャンネル番号“1, 15, 30”が表示される。この仮想サブチャンネル番号は、放送局が任意に設定できるものであり、この例のように不連続な番号を有する場合もある。このチャンネルマップでは、MPEG-2データのPAT 110を解析して得られた便宜上の仮想チャンネル番号とPSIPを解析して得られた本来の仮想チャンネル番号とを容易に区別できるように、半透明のOSD表示を行い、さらにアンダーラインを付している。

【0025】また、図5は、MPEG-2データのPAT から取得した便宜上の仮想チャンネル“2-1”(メインチャンネルが“2”、サブチャンネルが“1”)につ

いて、映像に付加して表示装置12にOSD表示させた画面を示している。図5(a)では、「PSIPを発見できなかった」旨の通知メッセージが付記されている。また、図5(b)では、便宜上の仮想チャンネル番号“2-1”を点滅表示させることにより、通常の仮想チャンネル番号ではないことを表示している。また、図5(c)では、便宜上の仮想チャンネル番号“2-1”を半透明のOSD表示を行うことにより、通常の仮想チャンネル番号ではないことを示している。

【0026】このように、本STB1によれば、PSIPを取得できない場合であっても、MPEG-2データに必ず含まれているPAT 110を解析することにより、便宜上の仮想チャンネル番号を取得しOSD表示することができる。また、こうして取得した便宜上の仮想チャンネル番号を、PSIPから取得した仮想チャンネル番号とは違う旨の、通常とは異なる形態でOSD表示を行うことにより、ユーザは、容易にその旨を判断することができる。

【0027】なお、本発明は上記実施形態の構成に限られることなく種々の変形が可能であり、例えば、便宜上の仮想チャンネル番号は、通常の仮想チャンネル番号と区別することなく、同様のOSD表示をしてもよい。また、STB1は、ATSCのデジタル放送信号に加えて、NTSCのアナログ放送信号をも受信することができる構成としてもよい。この場合、チューナ2はアナログ放送の配信される帯域の放送信号をも受信できるものとされ、STB1はチューナ2が受信したアナログ放送信号を復号するアナログデコーダを別途備えたものとされる。さらにまた、便宜上の仮想チャンネルの表示は、OSD表示に限られることなく、別途設けた液晶ディスプレイ等の表示装置に表示させるものであってもよい。

#### 【0028】

【発明の効果】以上のように請求項1の発明によれば、デジタル/アナログ放送受信装置において、PSIPを取得できない場合であっても、MPEG-2の情報パケットに含まれるPSIの1つであるPAT及びPMTを解析することにより、便宜上の仮想チャンネル番号を取得しOSD表示することができる。従って、ユーザは、自ら選択したチャンネルの仮想チャンネル番号を表示画面上で確認することができ、チャンネルの選択が容易に行

\*えるようになる。また、PAT及びPMTを解析して取得した便宜上の仮想チャンネル番号は、PSIPを解析して取得した仮想チャンネル番号とは相異なる形態のOSD表示がなされるので、ユーザは、容易に両者を区別することができる。

【0029】請求項2の発明によれば、デジタル放送受信装置において、PSIPを取得できない場合であっても、MPEG-2の情報パケットに含まれるPSIを解析することにより、便宜上の仮想チャンネル番号を取得しOSD表示することができる。従って、ユーザは、自ら選択したチャンネルの仮想チャンネル番号を表示画面上で確認することができ、チャンネルの選択が容易に行えるようになる。

【0030】請求項3の発明によれば、デジタル放送受信装置において、PSIPを取得したときは、それを解析して仮想チャンネル番号を取得しOSD表示するので、ユーザは、放送局が任意に設定した仮想チャンネル番号を知ることができる。

#### 【図面の簡単な説明】

【図1】 本発明の一実施形態によるデジタル放送受信装置のブロック構成図。

【図2】 同装置のTS解析回路のブロック構成図。

【図3】 同装置が解析するMPEG-2データを示した図

【図4】 同データを解析して得られた便宜上の仮想チャンネル番号を表示するチャンネルマップを示した図。

【図5】 同装置により画面表示される便宜上の仮想チャンネル番号の表示例を示した図。

#### 【符号の説明】

- 1 STB（放送受信装置）
- 2 チューナ（受信手段）
- 6a トランスポートパーサ（信号抽出手段）
- 6c ビデオデコーダ（デジタル復号手段）
- 6e OSD回路（OSD出力手段）
- 7 メモリ（記憶手段）
- 8 制御部（制御手段）
- 11 入力装置（入力手段）
- 12 表示装置（表示手段）
- 110 PAT
- 111a、111b PMT

【図4】

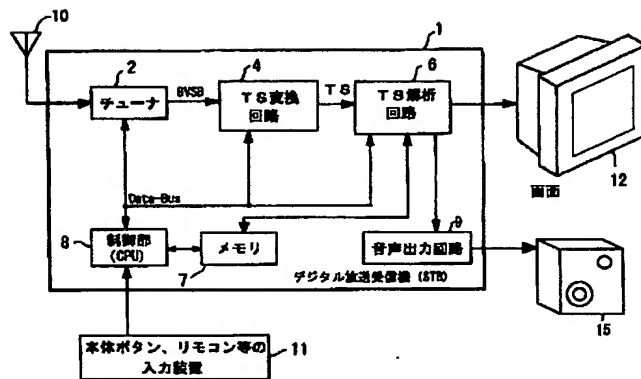
チャンネルマップ

物理CH No.	Digital/Analog	仮想Main Ch No.	仮想Sub Ch No.
1	Non		-
2	Digital	2	1, 2
	Non		-
4	Analog		-
5	Digital	15	1, 15, 30
6	Non		-

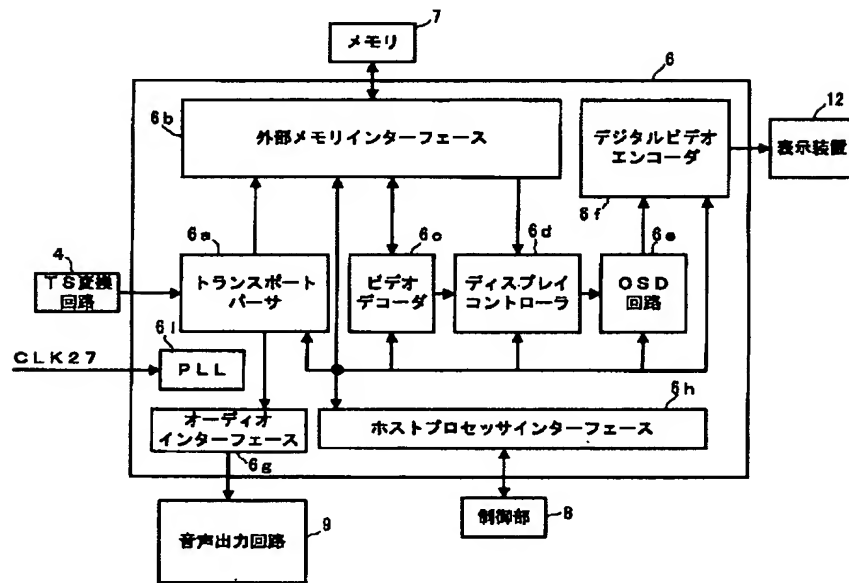
上記データを解析してメインチャンネル番号、サブチャンネル番号を得る。  
PSIPから得られるチャンネル番号とは異なる半透明の表示を出力する。



【図1】

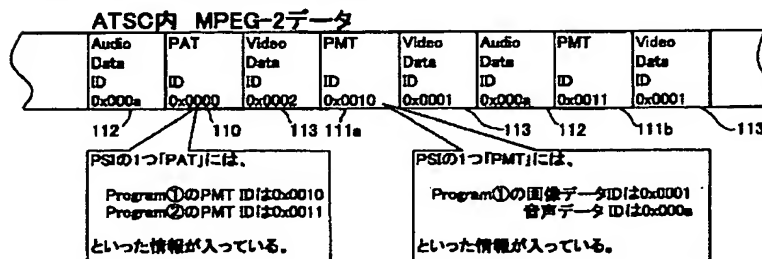


【図2】

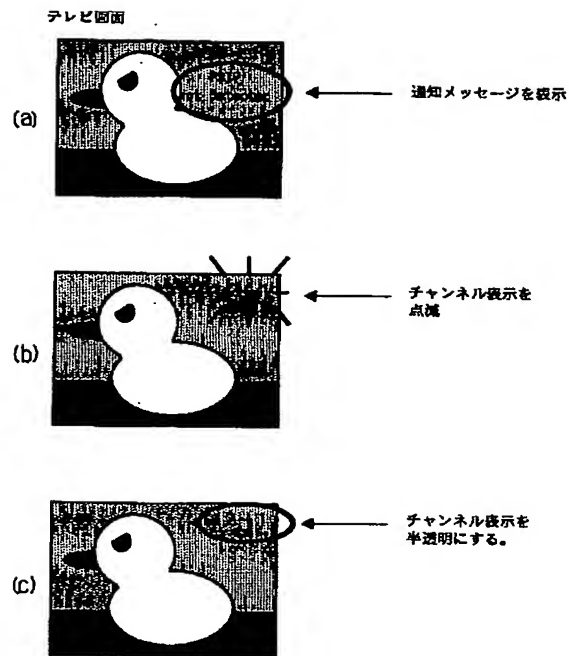


【図3】

米国ATSCの2chで、PSIPを含んでいない場合



【図5】



## フロントページの続き

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F ターム(参考) 5C025 AA23 AA28 AA29 AA30 BA25  
BA27 BA28 CA02 CA09 CA18  
CB10 DA01 DA05

5C063 AA01 AB03 AB07 AC01 AC10  
CA23 CA29 CA36 DA03 DA07  
DA13 EA01 EB37 EB45

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2.\*\*\*\* shows the word which can not be translated.

3.In the drawings, any words are not translated.

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**CLAIMS**

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[Claim(s)]

[Claim 1]An input means for inputting channel change instructions into a device main frame. You make it based on a standard of ATSC (Advanced Television Systems Committee) from a broadcasting station, and it is PSIP (Program.) to an information packet of MPEG(Moving Picture Experts Group)-2. A reception means which receives digital one / analog broadcasting signal sent after adding an information packet of and System Information Protocol.

A signal extraction means to extract a video signal, an audio signal, and a control signal from a digital broadcasting signal received by said reception means.

Digital one / analog decoding means outputted to a displaying means which displays an image which decoded a video signal contained in a video signal or an analog broadcasting signal extracted by said signal extraction means, and with which the decoded signal was connected to this equipment

A memory measure which memorizes a control signal extracted by said signal extraction means, A receiving channel number display function which is provided with an OSD output means which gives a predetermined onscreen display (it is hereafter described as OSD) indication to said displaying means, and a control means which controls each means of the above-mentioned equipment, and carries out the OSD display of the receiving channel number from said displaying means.

It is a broadcast receiving set which has the receiving channel number display function provided with the above, From a broadcasting station of a same or same system, a digital broadcasting signal and an analog broadcasting signal are sent by mutually different physical channel, and a digital broadcasting signal, A subchannel for being sent for said every physical channel and sending 1 per physical channel or two or more contents is included, And a virtual channel number which consists of the same number as a physical channel number and a subchannel number of said analog broadcasting is given to this subchannel, and said control means, By acquiring an information packet of said PSIP out of a control signal which said signal extraction means extracted, and referring to VCT (Virtual Channel Table) produced by analyzing it, When a virtual channel number to receive is specified, an OSD display of this virtual channel number is performed and PSIP is not able to be acquired out of said control signal, an information packet of said MPEG-2 is acquired, A virtual subchannel number on expedient is assigned to each subchannel according to turn of each subchannel of having analyzed and detected PAT (Program Association Table) and PMT (Program Map Table) which are contained in it, A virtual channel number which specified a channel number which consists of said physical channel number and a virtual subchannel number on [ said ] expedient by analyzing said VCT as a virtual channel number on expedient performs an OSD display of a different form.

[Claim 2]An input means for inputting channel change instructions into a device main frame. You make it based on a standard of ATSC (Advanced Television Systems Committee) from a broadcasting station, and it is PSIP (Program.) to an information packet of MPEG(Moving Picture Experts Group)-2. A reception means which receives a digital broadcasting signal sent after adding an information packet of and System Information Protocol.

A signal extraction means to extract a video signal, an audio signal, and a control signal from a digital broadcasting signal received by said reception means.

A digital decoding means outputted to a displaying means which displays an image which decoded a video signal contained in a video signal or an analog broadcasting signal extracted by said signal extraction means, and with which the decoded signal was connected to this equipment.

A memory measure which memorizes a control signal extracted by said signal extraction means, A receiving channel number display function which is provided with an OSD output means which gives a predetermined onscreen display (it is hereafter described as OSD) indication to said displaying means, and a control means which controls each means of the above-mentioned equipment, and carries out the OSD display of the receiving channel number from said displaying means.

It is a broadcast receiving set which has the receiving channel number display function provided with the above, From a broadcasting station of a same or same system, a digital broadcasting signal and an analog broadcasting signal are sent by mutually different physical channel, and a digital broadcasting signal, A subchannel for being sent for said every physical channel and sending 1 per physical channel or two or more contents is included, And a virtual channel number which consists of a physical channel number, the same number, and a subchannel number of said analog broadcasting is given to this subchannel, and said control means, An information packet of said MPEG-2 is acquired out of said control signal, A virtual subchannel number on expedient is assigned to each subchannel according to turn of each subchannel of having analyzed and detected PSI (Program Specific Information) contained in it, An OSD display is performed for a channel number which consists of said physical channel number and a virtual subchannel number on [ said ] expedient as a virtual channel number on expedient.

[Claim 3]When PSIP (Program and System Information Protocol) contained in a control signal which said signal extraction means extracted is acquired, said control means, By referring to VCT (Virtual Channel Table) produced by analyzing this PSIP, A broadcast receiving set which has the receiving channel number display function according to claim 2 specifying a virtual channel number to receive and carrying out the OSD display of this virtual channel number.

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[Translation done.]

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the digital broadcasting receiving set which has a receiving channel number display function which carries out an OSD display for the virtual channel number which starts a broadcast receiving set, especially is received to a displaying means.

[0002]

[Description of the Prior Art]Conventionally, in cable digital broadcasting etc., the 64QAM modulator is known as a modulator used when sending the image and audio signal which carried out compression encoding by MPEG-2 standard via a CATV transmission line (for example, refer to JP,2000-197020,A). This enables specification of whether the obstacle occurred with which 64QAM modulator from the displayed above-mentioned channel number, when a channel number is displayed on users' (addressee) broadcast receiving set and an obstacle occurs during broadcast reception. This modulator is used in the case of the broadcasting station side's dispatch of a broadcasting signal. Only the channel to which it can view and listen is outputted to a display screen, and the digital broadcasting receiving set which made a user's channel selection operation easy is known (for example, refer to JP,H10-200868,A).

[0003]By the way, in North America, the digital broadcasting based on ATSC (Advanced Television Systems Committee) from a broadcasting station is distributed in recent years. This digital broadcasting is received, The broadcast receiving set (set top box: describe it as STB below) for changing into the signal which the television receiver of analog broadcasting correspondence of existing NTSC (National Television Systems Committee) can televise is spreading. It is possible to give the function indicated by this STB at JP,H10-200868,A.

[0004]The digital broadcasting signal is sent in the digital broadcasting of ATSC by different physical channel from an analog broadcasting signal. One physical channel 1 or two or more contents including the subchannel for sending to this subchannel. The virtual channel number which consists of the same number (main channel number) as a physical channel number and subchannel number of the analog broadcasting sent from the broadcasting station of a same or same system is given. Therefore, the virtual channel is constituted by the main channel and the subchannel hierarchical.

[0005]The broadcasting signal of digital broadcasting consists of a video signal, an audio signal, and a control signal, and in the digital broadcasting of ATSC. A duty is imposed so that PSIP (Program and System Information Protocol) included the information about a virtual channel number or a broadcasting station name may be attached to the above-mentioned control signal and it may be sent to it. The control section of STB can specify the virtual channel number to receive by referring to VCT (Virtual Channel Table) obtained by acquiring and analyzing this PSIP. In digital broadcasting, as already stated, each channel is constituted by the main channel number and the subchannel number hierarchical, and since the composition is complicated, the user may be unable to understand composition of the channel which oneself chose. Then, STB carries out the OSD display of the virtual channel number which specified [ above-mentioned ] to a display device, and is aiming at improvement in a user's user-friendliness.

[0006]

[Problem to be solved by the invention]However, PSIP cannot be acquired, when the office which is sending the digital broadcasting signal without attaching PSIP as a control signal depending on a broadcasting station also exists and the channel of such a broadcasting station is received. Even if a broadcasting station attaches PSIP and is sending the broadcasting signal, acquisition of PSIP may go wrong according to a certain situation of inaccurate PSIP data having been added, for example to the signal of PSIP. Thus, when PSIP is unacquirable, even if possible, since it is unknown, acquiring a video signal and receiving a picture cannot perform the OSD display, and a user's user-friendliness is not good [ a thing / the virtual channel number ].

[0007]This invention is made in order to solve the problem mentioned above, and it is a thing. Also in the case where the purpose is not able to acquire PSIP contained in a broadcasting signal in a receiving set, By displaying the channel number on expedient, it is providing the broadcast receiving set which has a display function of the receiving channel number which aimed at improvement in user-friendliness for the channel change as an easy thing for a user.

[0008]

[Means for solving problem]To achieve the above objects, invention of Claim 1, The input means for inputting channel change instructions into a device main frame, You make it based on the standard of ATSC (Advanced Television Systems Committee) from a broadcasting station, and it is PSIP (Program.) to the information packet of MPEG(Moving Picture Experts Group)-2. The reception means which receives digital one / analog broadcasting signal sent after adding the information packet of and System Information Protocol, A signal extraction means to extract a video signal, an audio signal, and a control signal from the digital broadcasting signal received by the reception means, The video signal contained in the video signal or analog broadcasting signal extracted by the signal extraction means is decoded, Digital one / analog decoding means outputted to the displaying means which displays the image with which the decoded signal was connected to this equipment, It has a memory measure which memorizes the control signal extracted by the signal extraction means, an OSD output means which gives a predetermined onscreen display (it is hereafter described as OSD) indication to a displaying means, and a control means which controls each means of the above-mentioned equipment, In the broadcast receiving set which has a receiving channel number display function which carries out the OSD display of the receiving channel number from a displaying means, From the broadcasting station of a same or same system, a digital broadcasting signal and an analog broadcasting signal are sent by mutually different physical channel, and a digital broadcasting signal, The subchannel for being sent for every physical channel and sending 1 per physical channel or two or more contents is included, And the virtual channel number which consists of the same number as a physical channel number and subchannel number of analog broadcasting is given to this subchannel, and a control means, By acquiring the information packet of PSIP out of the control signal which the signal extraction means extracted, and referring to VCT (Virtual Channel Table) produced by analyzing it, When the virtual channel number to receive is specified, the OSD display of this virtual channel number is performed and PSIP is not able to be acquired out of a control signal, the information packet of MPEG-2 is acquired, The virtual subchannel number on expedient is assigned to each subchannel according to the turn of each subchannel of having analyzed and detected PAT (Program Association Table) and PMT (Program Map Table) which are contained in it, The virtual channel number which specified the channel number which consists of a physical channel number and a virtual subchannel number on expedient by analyzing VCT as a virtual channel number on expedient performs the OSD display of a different form.

[0009]In this composition, a digital broadcasting signal is sent from a broadcasting station including a video signal, an audio signal, and a control signal by the packet-ized data (MPEG-2 data) in which animation compression was carried out by MPEG-2 standard. The information packet of PSIP which has the information about the virtual channel for receiving ATSC broadcast is added to a control signal. PSI (Program Specific Information) etc. which have the information about the composition of a program are contained in the information packet of



MPEG-2. In ATSC, a duty is imposed so that PSIP may be attached to a digital broadcasting signal and may be sent, but being sent where this is not necessarily attached depending on a broadcasting station is not restricted. On the other hand, since PSI is information required in order to extract a video signal and an audio signal, it is sent in the state where it was always attached as an information packet in MPEG-2. When PSIP contained in a broadcasting signal is acquired, by referring to VCT produced by analyzing it, a control means specifies the virtual channel number to receive, and carries out the OSD display of the virtual channel number. When PSIP is not contained in a broadcasting signal and PSIP cannot be acquired according to a certain situation, PSI contained in MPEG-2 data is analyzed, the configuration information on a subchannel is acquired, and the subchannel number on expedient is assigned. In this composition, PAT and PMT which are one of the PSI(s) are analyzed, and the virtual subchannel number on expedient is assigned to each subchannel. A physical channel number and the virtual subchannel number on [ this ] expedient give the virtual channel number on expedient for an OSD display. Assigning the virtual subchannel number after [ expedient ] being obtained by analyzing PSI contained in this MPEG-2 data according to the turn of the program of PMT, the original subchannel number which a broadcasting station can set up arbitrarily is not necessarily a match. Then, a user distinguishes and does the OSD display of each with a different form so that the virtual channel number after [ expedient ] being obtained by analyzing MPEG-2 data, and the original virtual channel number acquired by analyzing PSIP can be distinguished. Distinction of this OSD display may be repealed by a user's request. In this case, the virtual channel number on expedient is outputted as the same OSD display as the usual virtual channel number.

[0010]An input means for invention of Claim 2 to input channel change instructions into a device main frame, You make it based on the standard of ATSC (Advanced Television Systems Committee) from a broadcasting station, and it is PSIP (Program.) to the information packet of MPEG(Moving Picture Experts Group)-2. The reception means which receives the digital broadcasting signal sent after adding the information packet of and System Information Protocol, A signal extraction means to extract a video signal, an audio signal, and a control signal from the digital broadcasting signal received by the reception means, The video signal contained in the video signal or analog broadcasting signal extracted by the signal extraction means is decoded, The digital decoding means outputted to the displaying means which displays the image with which the decoded signal was connected to this equipment, It has a memory measure which memorizes the control signal extracted by the signal extraction means, an OSD output means which gives a predetermined onscreen display (it is hereafter described as OSD) indication to a displaying means, and a control means which controls each means of the above-mentioned equipment, In the broadcast receiving set which has a receiving channel number display function which carries out the OSD display of the receiving channel number from a displaying means, From the broadcasting station of a same or same system, a digital broadcasting signal and an analog broadcasting signal are sent by mutually different physical channel, and a digital broadcasting signal, The subchannel for being sent for every physical channel and sending 1 per physical channel or two or more contents is included, And the virtual channel number which consists of the physical channel number, the same number, and subchannel number of analog broadcasting is given to this subchannel, and a control means, Acquire the information packet of MPEG-2 out of a control signal, and the virtual subchannel number on expedient is assigned to each subchannel according to the turn of each subchannel of having analyzed and detected PSI (ProgramSpecific Information) contained in it, An OSD display is performed for the channel number which consists of a physical channel number and a virtual subchannel number on expedient as a virtual channel number on expedient.

[0011]In this composition, a broadcasting signal is sent from a broadcasting station like Claim 1 by MPEG-2 packet-ized data in which animation compression was carried out by MPEG-2 standard. The information packet of PSIP which has the information about a virtual channel as a control signal is added. PSI etc. which have the information about the composition of a program are included in MPEG-2 data. A control means analyzes PSI contained in MPEG-2 data, and assigns the subchannel number on expedient. That is, PSI is assigned as a virtual subchannel number on expedient according to the turn of each subchannel analyzed and detected. By the

physical channel number and the virtual subchannel number on [ this ] expedient, the virtual channel number on expedient for an OSD display is given, and the OSD display of this is carried out.

[0012]Invention of Claim 3 the receiving channel number display function according to claim 2 in the broadcast receiving set which it has a control means, When PSIP (Program and System Information Protocol) contained in the control signal which the signal extraction means extracted is acquired, By referring to VCT (Virtual Channel Table) produced by analyzing this PSIP, the virtual channel number to receive is specified and the OSD display of this virtual channel number is carried out. In this composition, when PSIP is acquired, by analyzing this PSIP, a broadcasting station acquires the virtual channel number set up arbitrarily, and carries out the OSD display of this.

[0013]

[Mode for carrying out the invention]The digital broadcasting receiving set (set top box: describe it as STB below) hereafter applied to one embodiment which materialized this invention is explained with reference to Drawings. Drawing 1 shows the block configuration of STB. According to operational inputs, such as a channel change from the user who used the input devices 11 (input means), such as a body button or a remote control, STB1, It is equipment which receives the coded digital broadcasting signal which is sent from the Television Sub-Division broadcasting station, and is based on ATSC with the antenna 10, is changed into the video signal based on NTSC, and is displayed on the display device 12 (displaying means). How to input and change a channel number directly as operation of a channel change with "the ten key (numerical keypad)" with which the input device is equipped, for example, The method of changing into the channel which operates "the up-and-down key (arrow key)" with which the input device 11 is equipped, and adjoins up and down is taken. Also when a user operates the latter "up-and-down key" and changes a channel, STB1 so that he can understand the virtual channel number of change time immediately, The virtual channel number received by acquiring and analyzing PSIP is specified, and it has a function which carries out an OSD display to the display device 12. In ATSC, the digital broadcasting signal which animation compression was carried out [ the digital broadcasting signal ] by MPEG-2 standard and was packet-ized is sent.

[0014]STB1 is provided with the following.

For example, the tuner 2 (reception means) which receives the digital broadcasting signal transmitted by the modulation method of 8VSB (Vestigial Side Band).

The TS conversion circuit 4 which changes into a transport stream (below Transport Stream: describes it as TS) signal the digital broadcasting signal received with the tuner 2.

TS analysis circuit 6 which analyzes the TS signal which the TS conversion circuit 4 changed, decodes a video signal, and displays an image on the display device 12.

The memory 7 (memory measure) which memorizes the channel information about the dispatch frequency of each main channel of digital broadcasting, broadcast language, etc., The control section 8 (control means) which consists of the voice response circuit 9 which extracts the digital sound signal of predetermined broadcast language, and makes a sound output to the loudspeaker device 15, and a CPU which controls each part of a receiving set.

[0015]The tuner 2 receives supply of the digital broadcasting signal received by the antenna 10, channel selection operation is performed according to the instructions which the user inputted into the control section 8 from the input device 11, and the digital broadcasting signal of 8VSB abnormal conditions which exist in the frequency band corresponding to the channel which the user inputted is received. The TS conversion circuit 4 changes into a TS signal the broadcasting signal of 8VSB abnormal conditions which the tuner 2 received.

[0016]TS analysis circuit 6 analyzes the TS signal which the TS conversion circuit 4 changed, and outputs the video signal which added the OSD display if needed to the display device 12. Drawing 2 shows the block configuration of TS analysis circuit 6. TS analysis circuit 6 is provided with the following.

Transport purser 6a (signal extraction means).

External memory interface 6b.

Video decoder 6c (digital decoding means).

The controller displays 6d, OSD circuit 6e (OSD output means), the digital video encoder 6f, the audio interface 6g, the host processor interface 6h, and the PLL (Phase Locked Loop) circuit 6i. The transport purser 6a acquires the TS signal transmitted from the TS conversion circuit 4, and decomposes this into a video signal, an audio signal, and a control signal. The external memory interface 6b receives the instructions from the control section 8 via the host processor interface 6h, and manages connection between the transport purser 6a, the video decoder 6c and the controller displays 6d, and the memory 7. For example, the video signal, audio signal, and control signal which were decomposed by the transport purser 6a are stored in the memory 7 via the external memory interface 6b, respectively.

[0017]The video decoder 6c receives the instructions from the control section 8, and reads and decodes the video signal made to store in the memory 7. The controller displays 6d receive the instructions from the control section 8, and change into the format of NTSC the video signal which the video decoder 6c decoded. OSD circuit 6e receives the instructions from the control section 8, sends out the video signal of NTSC which the video decoder 6c changed to the digital video encoder 6f, and also it sends out the signal which added the OSD display to the video signal if needed to the digital video encoder 6f. This OSD circuit 6e can perform data processing which adds an OSD display for every video signal of one frame according to the instructions from the control section 8, and can display the OSD display by a predetermined color on the display device 12. In order to perform the above-mentioned data processing, the memory is built in OSD circuit 6e.

[0018]The digital video encoder 6f receives the instructions from the control section 8, changes into an analog signal the video signal sent out from OSD circuit 6e, and outputs it to the display device 12. The audio interface 6g sends out the audio signal which the transport purser 6a decomposed to the voice response circuit 9. The host processor interface 6h transmits the instructions from the control section 8 to the transport purser 6a, the external memory interface 6b, the video decoder 6c, the controller displays 6d, OSD circuit 6e, and the digital video encoder 6f. PLL circuit 6i coincides local oscillation frequency with predetermined frequency based on the clock signal inputted.

[0019]The memory 7 memorizes MPEG-2 data which the transport purser 6a disassembled. This MPEG-2 data will be later explained in full detail with reference to drawing 3. The control section 8 performs control of each part through a data bus (Data-Bus) in response to the alter operation using the input device 11 by a user. For example, the control section 8 reads and analyzes PSIP contained in the control signal stored in the memory 7, The virtual channel number of the channel received based on the status signal included in it is acquired, and this virtual channel number is made to output to the display device 12 via OSD circuit 6e and the digital video encoder 6f.

[0020]The voice response circuit 9 changes into the audio signal corresponding to the loudspeaker device 15 the audio signal acquired from the audio interface 6g, and sends out this audio signal to the loudspeaker device 15. Decoding processing of the audio signal about the broadcast language directed from the control section 8 was specifically extracted and carried out, and it has changed into the analog signal. The input device 11 is equipment for inputting operator command, such as a channel change by a user, to the control section 8. As an example of this input device 11, the body button provided in the front face of STB1, the remote control which performs the operating command of STB1 using infrared rays etc., etc. are mentioned. The display screen of a television receiver may be used for the display device 12, and they may be flat panel display devices, such as LCD (Liquid Crystal Display) and PDP (Plasma DisplayPanel) besides CRT. As long as the display device 12 supports the input of a digital signal in that case, it may be the composition directly connected to the input terminal of the display device 12 from OSD circuit 6e, without passing the digital video encoder 6f. It is connected to the voice response circuit 9, and the loudspeaker device 15 outputs a sound based on the audio signal processed in the voice response circuit 9.

[0021]PSIP is analyzed, and the control section 8 acquires the virtual channel number of the channel to receive, and is made to carry out an OSD display to the display device 12, as

mentioned above. When PSIP is not able to be acquired according to a certain situation, the control section 8 analyzes MPEG-2 data contained in a broadcasting signal, and gives the virtual channel number on expedient.

[0022]Drawing 3 shows an example of MPEG-2 data memorized by the memory as a TS signal. MPEG-2 data -- PSI and an audio signal (voice data) -- 112 and a video signal (image data) -- it has 113. Although the above PSI is data certainly contained and has neither a virtual channel number nor a broadcasting station name in MPEG-2 data, it has PAT 110 as program data configuration information and PMT 111a, and 111b. The information about PMT ID of the program number respectively corresponding to all the subchannels currently broadcast within the physical channel to receive is stored in PAT 110. For example, PMT ID of program \*\* which is one of the subchannels is 0x0010, and the information that PMT ID of program \*\* which is another subchannel is 0x0011 is stored. Here, when receiving the subchannel of program \*\*, according to the information on the above-mentioned PAT 110, an ID number reads the data stored in PMT 111a which is 0x0010. Image data ID of program \*\* is 0x0001, and the information that same sound voice data ID is 0x000a is stored in PMT 111a. According to this information on PMT 111a, the video decoder 6c reads one by one what the ID number of [ 0x0001 ] image data 113 was given, The voice response circuit 9 reads one by one what the ID number of 0x000a was given among voice data 112, and decodes the video signal and audio signal of a subchannel of program \*\*, respectively. Thus, PAT 110 is always contained in MPEG-2 data, in order to extract a video signal and an audio signal from a broadcasting signal.

[0023]The control section 8 can acquire PMT ID respectively corresponding to all the subchannels currently broadcast within the physical channel to receive by analyzing the information stored in PAT 110 of MPEG-2 data. The control section 8 assigns the virtual subchannel number on expedient according to the turn of PMT ID respectively corresponding to each subchannel. Since the subchannel number after [ expedient ] doing in this way and assigning turns into a number which follows in order of PMT ID, the virtual subchannel number which the broadcasting station set up arbitrarily is not necessarily a match.

[0024]Drawing 4 shows an example of the channel map which displays the information about the virtual channel number after [ expedient ] analyzing MPEG-2 data as mentioned above and acquiring about a physical channel "2." Since the main channel number of imagination here of a physical channel "2" was not able to acquire PSIP, it has given the "2" as a physical channel. [ same as a number on expedient ] And "1" and "2" which are the virtual subchannel numbers after [ expedient ] assigning like the above are given to a virtual subchannel number. Since the virtual subchannel number on [ this ] expedient is assigning the program number of PAT 110, it comprises a continuous number. It usually passes in a physical channel "5", and the main channel number "15" and virtual subchannel number (1, and "15, 30") of imagination which analyzed and acquired PSIP are displayed on it. A broadcasting station can set up this virtual subchannel number arbitrarily, and it may have a discontinuous number like this example. In this channel map, a translucent OSD display is performed and the underline is further attached so that the original virtual channel number acquired by analyzing a virtual channel number and PSIP after [ expedient ] being obtained by analyzing PAT 110 of MPEG-2 data can be distinguished easily.

[0025]Drawing 5 shows the screen which was added to the image and carried out the OSD display to the display device 12 about the virtual channel "2-1" (a main channel is "2" and a subchannel is "1") after [ expedient ] acquiring from PAT of MPEG-2 data. In drawing 5 (a), the notification message of the purport "which was not able to discover PSIP" is written in addition. In drawing 5 (b), it is indicating that it is not the usual virtual channel number by indicating the virtual channel number "2-1" on expedient by blink. By drawing 5 (c), by performing a translucent OSD display for the virtual channel number "2-1" on expedient shows that it is not the usual virtual channel number.

[0026]Thus, according to this STB1, even if it is a case where PSIP is unacquirable, the OSD display of the virtual channel number on expedient can be acquired and carried out by analyzing PAT 110 always contained in MPEG-2 data. The user can judge that easily by performing an OSD display with a different form from usual [ of the purport that the virtual channel number

which acquired the virtual channel number after / expedient / acquiring in this way from PSIP is differed from ].

[0027] Various modification is possible for this invention, without being restricted to the composition of the above-mentioned embodiment, for example, the virtual channel number on expedient may carry out the same OSD display, without distinguishing from the usual virtual channel number. STB1 is good also as composition which can also receive the analog broadcasting signal of NTSC in addition to the digital broadcasting signal of ATSC. In this case, the tuner 2 should also have the broadcasting signal of a zone with which analog broadcasting is distributed received, and it should have STB1 separately in the analog decoder which decodes the analog broadcasting signal which the tuner 2 received. The display of the virtual channel on expedient may be displayed on display devices, such as a liquid crystal display provided separately, further again, without being restricted to an OSD display.

[0028]

[Effect of the Invention] In [ according to invention of Claim 1 as mentioned above ] digital one / analog broadcasting receiving set, Even if it is a case where PSIP is unacquirable, the OSD display of the virtual channel number on expedient can be acquired and carried out by analyzing PAT and PMT which are one of the PSI(s) contained in the information packet of MPEG-2. Therefore, the user can check the virtual channel number of the himself selected channel on a display screen, and can choose a channel now easily. Since the OSD display of a different form is made, the user can distinguish both from the virtual channel number which the virtual channel number after [ expedient ] analyzing and acquiring PAT and PMT analyzed PSIP, and was acquired easily.

[0029] According to invention of Claim 2, in a digital broadcasting receiving set, even if it is a case where PSIP is unacquirable, the OSD display of the virtual channel number on expedient can be acquired and carried out by analyzing PSI contained in the information packet of MPEG-2. Therefore, the user can check the virtual channel number of the himself selected channel on a display screen, and can choose a channel now easily.

[0030] Since according to invention of Claim 3 it is analyzed and the OSD display of the virtual channel number is acquired and carried out in a digital broadcasting receiving set when PSIP is acquired, the user can know the virtual channel number which the broadcasting station set up arbitrarily.

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[Translation done.]

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**TECHNICAL FIELD**

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[Field of the Invention]This invention relates to the digital broadcasting receiving set which has a receiving channel number display function which carries out an OSD display for the virtual channel number which starts a broadcast receiving set, especially is received to a displaying means.

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[Translation done.]



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**PRIOR ART**

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[Description of the Prior Art]Conventionally, in cable digital broadcasting etc., the 64QAM modulator is known as a modulator used when sending the image and audio signal which carried out compression encoding by MPEG-2 standard via a CATV transmission line (for example, refer to JP,2000-197020,A). This enables specification of whether the obstacle occurred with which 64QAM modulator from the displayed above-mentioned channel number, when a channel number is displayed on users' (addressee) broadcast receiving set and an obstacle occurs during broadcast reception. This modulator is used in the case of the broadcasting station side's dispatch of a broadcasting signal. Only the channel to which it can view and listen is outputted to a display screen, and the digital broadcasting receiving set which made a user's channel selection operation easy is known (for example, refer to JP,H10-200868,A).

[0003]By the way, in North America, the digital broadcasting based on ATSC (Advanced Television Systems Committee) from a broadcasting station is distributed in recent years. This digital broadcasting is received, The broadcast receiving set (set top box: describe it as STB below) for changing into the signal which the television receiver of analog broadcasting correspondence of existing NTSC (National Television Systems Committee) can televise is spreading. It is possible to give the function indicated by this STB at JP,H10-200868,A.

[0004]The digital broadcasting signal is sent in the digital broadcasting of ATSC by different physical channel from an analog broadcasting signal. One physical channel 1 or two or more contents including the subchannel for sending to this subchannel. The virtual channel number which consists of the same number (main channel number) as a physical channel number and subchannel number of the analog broadcasting sent from the broadcasting station of a same or same system is given. Therefore, the virtual channel is constituted by the main channel and the subchannel hierarchical.

[0005]The broadcasting signal of digital broadcasting consists of a video signal, an audio signal, and a control signal, and in the digital broadcasting of ATSC. A duty is imposed so that PSIP (Program and System Information Protocol) included the information about a virtual channel number or a broadcasting station name may be attached to the above-mentioned control signal and it may be sent to it. The control section of STB can specify the virtual channel number to receive by referring to VCT (Virtual Channel Table) obtained by acquiring and analyzing this PSIP. In digital broadcasting, as already stated, each channel is constituted by the main channel number and the subchannel number hierarchical, and since the composition is complicated, the user may be unable to understand composition of the channel which oneself chose. Then, STB carries out the OSD display of the virtual channel number which specified [ above-mentioned ] to a display device, and is aiming at improvement in a user's user-friendliness.

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**EFFECT OF THE INVENTION**

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[Effect of the Invention]In [ according to invention of Claim 1 as mentioned above ] digital one / analog broadcasting receiving set, Even if it is a case where PSIP is unacquirable, the OSD display of the virtual channel number on expedient can be acquired and carried out by analyzing PAT and PMT which are one of the PSI(s) contained in the information packet of MPEG-2. Therefore, the user can check the virtual channel number of the himself selected channel on a display screen, and can choose a channel now easily.Since the OSD display of a different form is made, the user can distinguish both from the virtual channel number which the virtual channel number after [ expedient ] analyzing and acquiring PAT and PMT analyzed PSIP, and was acquired easily.

[0029]According to invention of Claim 2, in a digital broadcasting receiving set, even if it is a case where PSIP is unacquirable, the OSD display of the virtual channel number on expedient can be acquired and carried out by analyzing PSI contained in the information packet of MPEG-2. Therefore, the user can check the virtual channel number of the himself selected channel on a display screen, and can choose a channel now easily.

[0030]In invention of Claim 3, in a digital broadcasting receiving set, when PSIP is acquired, it is analyzed, and the OSD display of the virtual channel number is acquired and carried out. Therefore, the user can know the virtual channel number which the broadcasting station set up arbitrarily.

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**TECHNICAL PROBLEM**

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[Problem to be solved by the invention]However, PSIP cannot be acquired, when the office which is sending the digital broadcasting signal without attaching PSIP as a control signal depending on a broadcasting station also exists and the channel of such a broadcasting station is received. Even if a broadcasting station attaches PSIP and is sending the broadcasting signal, acquisition of PSIP may go wrong according to a certain situation of inaccurate PSIP data having been added, for example to the signal of PSIP. Thus, when PSIP is unacquirable, even if possible, since it is unknown, acquiring a video signal and receiving a picture cannot perform the OSD display, and a user's user-friendliness is not good [ a thing / the virtual channel number ].  
[0007]This invention is made in order to solve the problem mentioned above, and it is a thing. Also in the case where the purpose is not able to acquire PSIP contained in a broadcasting signal in a receiving set, By displaying the channel number on expedient, it is providing the broadcast receiving set which has a display function of the receiving channel number which aimed at improvement in user-friendliness for the channel change as an easy thing for a user.

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**MEANS**

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[Means for solving problem]To achieve the above objects, invention of Claim 1, The input means for inputting channel change instructions into a device main frame, You make it based on the standard of ATSC (Advanced Television Systems Committee) from a broadcasting station, and it is PSIP (Program.) to the information packet of MPEG(Moving Picture Experts Group)-2. The reception means which receives digital one / analog broadcasting signal sent after adding the information packet of and System Information Protocol, A signal extraction means to extract a video signal, an audio signal, and a control signal from the digital broadcasting signal received by the reception means, The video signal contained in the video signal or analog broadcasting signal extracted by the signal extraction means is decoded, Digital one / analog decoding means outputted to the displaying means which displays the image with which the decoded signal was connected to this equipment, It has a memory measure which memorizes the control signal extracted by the signal extraction means, an OSD output means which gives a predetermined onscreen display (it is hereafter described as OSD) indication to a displaying means, and a control means which controls each means of the above-mentioned equipment, In the broadcast receiving set which has a receiving channel number display function which carries out the OSD display of the receiving channel number from a displaying means, From the broadcasting station of a same or same system, a digital broadcasting signal and an analog broadcasting signal are sent by mutually different physical channel, and a digital broadcasting signal, The subchannel for being sent for every physical channel and sending 1 per physical channel or two or more contents is included, And the virtual channel number which consists of the same number as a physical channel number and subchannel number of analog broadcasting is given to this subchannel, and a control means, By acquiring the information packet of PSIP out of the control signal which the signal extraction means extracted, and referring to VCT (Virtual Channel Table) produced by analyzing it, When the virtual channel number to receive is specified, the OSD display of this virtual channel number is performed and PSIP is not able to be acquired out of a control signal, the information packet of MPEG-2 is acquired, The virtual subchannel number on expedient is assigned to each subchannel according to the turn of each subchannel of having analyzed and detected PAT (Program Association Table) and PMT (Program Map Table) which are contained in it, The virtual channel number which specified the channel number which consists of a physical channel number and a virtual subchannel number on expedient by analyzing VCT as a virtual channel number on expedient performs the OSD display of a different form.

[0009]In this composition, a digital broadcasting signal is sent from a broadcasting station including a video signal, an audio signal, and a control signal by the packet-ized data (MPEG-2 data) in which animation compression was carried out by MPEG-2 standard. The information packet of PSIP which has the information about the virtual channel for receiving ATSC broadcast is added to a control signal. PSI (Program Specific Information) etc. which have the information about the composition of a program are contained in the information packet of MPEG-2. In ATSC, a duty is imposed so that PSIP may be attached to a digital broadcasting signal and may be sent, but being sent where this is not necessarily attached depending on a broadcasting station is not restricted. On the other hand, since PSI is information required in

order to extract a video signal and an audio signal, it is sent in the state where it was always attached as an information packet in MPEG-2. When PSIP contained in a broadcasting signal is acquired, by referring to VCT produced by analyzing it, a control means specifies the virtual channel number to receive, and carries out the OSD display of the virtual channel number. When PSIP is not contained in a broadcasting signal and PSIP cannot be acquired according to a certain situation, PSI contained in MPEG-2 data is analyzed, the configuration information on a subchannel is acquired, and the subchannel number on expedient is assigned. In this composition, PAT and PMT which are one of the PSI(s) are analyzed, and the virtual subchannel number on expedient is assigned to each subchannel. A physical channel number and the virtual subchannel number on [ this ] expedient give the virtual channel number on expedient for an OSD display. Assigning the virtual subchannel number after [ expedient ] being obtained by analyzing PSI contained in this MPEG-2 data according to the turn of the program of PMT, the original subchannel number which a broadcasting station can set up arbitrarily is not necessarily a match. Then, a user distinguishes and does the OSD display of each with a different form so that the virtual channel number after [ expedient ] being obtained by analyzing MPEG-2 data, and the original virtual channel number acquired by analyzing PSIP can be distinguished. Distinction of this OSD display may be repealed by a user's request. In this case, the virtual channel number on expedient is outputted as the same OSD display as the usual virtual channel number.

[0010]An input means for invention of Claim 2 to input channel change instructions into a device main frame, You make it based on the standard of ATSC (Advanced Television Systems Committee) from a broadcasting station, and it is PSIP (Program.) to the information packet of MPEG(Moving Picture Experts Group)-2. The reception means which receives the digital broadcasting signal sent after adding the information packet of and System Information Protocol, A signal extraction means to extract a video signal, an audio signal, and a control signal from the digital broadcasting signal received by the reception means, The video signal contained in the video signal or analog broadcasting signal extracted by the signal extraction means is decoded, The digital decoding means outputted to the displaying means which displays the image with which the decoded signal was connected to this equipment, It has a memory measure which memorizes the control signal extracted by the signal extraction means, an OSD output means which gives a predetermined onscreen display (it is hereafter described as OSD) indication to a displaying means, and a control means which controls each means of the above-mentioned equipment, In the broadcast receiving set which has a receiving channel number display function which carries out the OSD display of the receiving channel number from a displaying means, From the broadcasting station of a same or same system, a digital broadcasting signal and an analog broadcasting signal are sent by mutually different physical channel, and a digital broadcasting signal, The subchannel for being sent for every physical channel and sending 1 per physical channel or two or more contents is included, And the virtual channel number which consists of the physical channel number, the same number, and subchannel number of analog broadcasting is given to this subchannel, and a control means, Acquire the information packet of MPEG-2 out of a control signal, and the virtual subchannel number on expedient is assigned to each subchannel according to the turn of each subchannel of having analyzed and detected PSI (ProgramSpecific Information) contained in it, An OSD display is performed for the channel number which consists of a physical channel number and a virtual subchannel number on expedient as a virtual channel number on expedient.

[0011]In this composition, a broadcasting signal is sent from a broadcasting station like Claim 1 by MPEG-2 packet-ized data in which animation compression was carried out by MPEG-2 standard. An information packet of PSIP which has the information about a virtual channel as a control signal is added. PSI etc. which have the information about composition of a program are included in MPEG-2 data. A control means analyzes PSI contained in MPEG-2 data, and assigns a subchannel number on expedient. That is, PSI is assigned as a virtual subchannel number on expedient according to turn of each subchannel analyzed and detected. By physical channel number and a virtual subchannel number on [ this ] expedient, a virtual channel number on expedient for an OSD display is given, and the OSD display of this is carried out.

[0012]Invention of Claim 3 the receiving channel number display function according to claim 2 in

a broadcast receiving set which it has a control means, When PSIP (Program and System Information Protocol) contained in a control signal which a signal extraction means extracted is acquired, By referring to VCT (Virtual Channel Table) produced by analyzing this PSIP, a virtual channel number to receive is specified and the OSD display of this virtual channel number is carried out. In this composition, when PSIP is acquired, by analyzing this PSIP, a broadcasting station acquires a virtual channel number set up arbitrarily, and carries out the OSD display of this.

[0013]

[Mode for carrying out the invention]The digital broadcasting receiving set (set top box: describe it as STB below) hereafter applied to one embodiment which materialized this invention is explained with reference to Drawings. Drawing 1 shows the block configuration of STB. STB1 is the input devices 11, such as a body button or a remote control.

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**DESCRIPTION OF DRAWINGS**

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[Brief Description of the Drawings]

[Drawing 1]The block block diagram of the digital broadcasting receiving set by one embodiment of this invention.

[Drawing 2]The block block diagram of TS analysis circuit of the equipment.

[Drawing 3]The figure showing MPEG-2 data which the equipment analyzes

[Drawing 4]The figure showing the channel map which displays the virtual channel number after [ expedient ] being obtained by analyzing the data.

[Drawing 5]The figure showing the display example of a virtual channel number when [ expedient ] a screen display is carried out by the equipment.

[Explanations of letters or numerals]

1 STB (broadcast receiving set)

2 Tuner (reception means)

6a Transport purser (signal extraction means)

6c Video decoder (digital decoding means)

6e OSD circuit (OSD output means)

7 Memory (memory measure)

8 Control section (control means)

11 Input device (input means)

12 Display device (displaying means)

110 PAT

111a, 111b PMT

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[Drawing 4]

処理OH No.	Digital/Analog	仮想Main Ch No.	仮想Sub Ch No.
1	Non		-
2	Digital	2	1 2
	Non		-
4	Analog		-
5	Digital	15	1 15 30
8	Non		-

上記データを解析してメインチャンネル番号、サブチャンネル番号を得る。

PSIPから得られるチャンネル番号とは異なる半透明の表示を出力する。

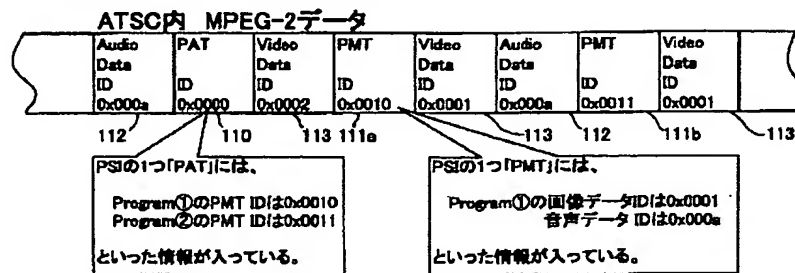
The block diagram illustrates the internal architecture of a digital broadcast receiver (1). It includes the following components and connections:

- Antenna (10):** Connected to the tuner (2) via a cable.
- Tuner (2):** Receives signals from the antenna and outputs  $8VSB$  to the TS conversion circuit (4). It also receives control signals  $D0-D15$  from the CPU (8).
- TS Conversion Circuit (4):** Converts the  $8VSB$  signal into a TS stream, which is then sent to the TS demodulation circuit (6).
- TS Demodulation Circuit (6):** Demodulates the TS stream and outputs video data  $D0-D15$  to the CPU (8) and audio data to the audio output circuit (9).
- Microcontroller (CPU) (8):** Manages the system, receiving control signals from the external input device (11) and controlling the tuner (2) and TS demodulation circuit (6).
- Memory (7):** Provides storage for the system, connected to the CPU (8).
- Audio Output Circuit (9):** Processes audio data from the TS demodulation circuit (6) and sends it to the external speaker (15).
- External Devices:**
  - Display (12):** Receives video data from the TS demodulation circuit (6) to show the program.
  - Speaker (15):** Receives audio data from the audio output circuit (9) to provide sound.
- Input Device (11):** Includes the main body button and remote control, providing control signals to the CPU (8).

The entire system is labeled as a **デジタル放送受信機 (DTV)** (Digital Broadcast Receiver).

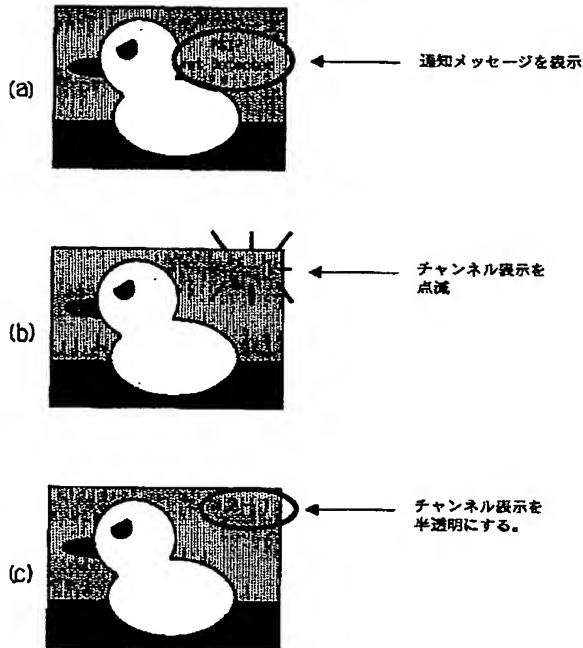
## [Drawing 3]

米国ATSCの2chで、PSIPを含んでいない場合



## [Drawing 5]

テレビ画面



[Translation done.]